Submission No 42

THE ELECTRICITY OUTAGES AFFECTING FAR WEST NSW IN OCTOBER 2024

Organisation: Hydrostor

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Macquarie Street
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Subject Line: Hydrostor submission

Dear Committee Members,

Hydrostor thanks the Committee on Environment and Planning for the opportunity to provide a submission to the Inquiry reviewing the electricity outages affecting Far West NSW in October 2024. The events at the end of last year underscored the significant impact that unexpected and prolonged outages have on the community, particularly given the region's remoteness. This distance from infrastructure and supply chains, exacerbates the community's vulnerability to extended outages and their consequences. Addressing this complex issue requires innovative solutions to ensure that the back-up energy supply is not only robust and reliable but also sustainable. It is critical that the electricity supply is backed up for unexpected outages, such as those caused by storms and extreme weather, as well as for routine maintenance outages.

Our submission contributes to the term of reference that Hydrostor has the most direct and meaningful perspective to: "any recommendations on future alternative power supply emergency response and effective redundancy". Therefore, this submission will outline:

- Details on the Silver City Energy Storage project's Advanced Compressed Air Energy Storage (A-CAES) facility and how it fits into the long-term solution for reliability in Broken Hill
- A summary of the regulatory process that led to Silver City being selected as the preferred option for reliability in Broken Hill and its surrounds
- The benefits to the system, and other supporting measures Silver City provides in the event of an outage.
- Timelines for the project.

We would like to note the critical importance of NSW's nation-leading efforts to develop a decarbonised grid, and the actions taken by successive governments with bipartisan support. Without this approach and associated policy settings, including state-wide initiatives under the *Electricity Infrastructure Investment Act*, projects such as the non-emitting Silver City A-CAES solution would not be possible. Similarly, we acknowledge the ongoing dedication and efforts of Transgrid in establishing this non-emitting, sustainable long-term back-up supply solution for Broken

Hill and its surrounds, including the important operational precedent for a mini-grid application in NSW as well as large-scale regulatory precedent for a non-network solution in Australia.

About Hydrostor

Hydrostor, a private company founded in 2010 in Canada with branch offices in the USA and Australia, is a developer of proprietary Advanced Compressed Air Energy Storage technology (A-CAES). Hydrostor has signed utility contracts for large-scale facilities in California as well as operating demonstration, commercially contracted and grid connected assets since 2015 in Ontario, Canada. Hydrostor's Australian operations are currently focused on the Silver City Energy Storage Centre in Broken Hill, which is in late-stage development. In addition, Hydrostor, working with CSIRO, has identified several thousand megawatts of technically and economically viable A-CAES deployment potential across NSW and other Australian jurisdictions. Hydrostor is actively developing two 500MW, 8hr A-CAES projects in the Wellington and Wagga Wagga regions of NSW, building on Silver City as its Australian precedent.

A-CAES is based on compressed air technology which has decades of proven operational precedent in Germany and USA (since the 1970s). A-CAES however, solves the two main constraints of traditional compressed air energy storage by storing and using heat, eliminating the need for natural gas, and constructing optimised sub-surface caverns instead of exclusively salt caverns. The resource is a 100% emission free solution that can be strategically and flexibly located where needed, including multiple locations of grid value in NSW.

A-CAES has unique advantages as a long-duration energy storage solution. It can be constructed in places where other forms of large-scale synchronous generator-based storage cannot (like pumped hydro and traditional-CAES). Unlike battery storage technology, A-CAES is cost-effective at long durations (6 hours+), has an exceptionally long service life of over 50 years without performance degradation and without significant requirements for augmentation. It also provides numerous grid benefits like synchronous inertia, frequency response ancillary services, and significant ramping flexibility to manage minimum demand, critical for maintaining system strength and keeping the lights on in constrained grids like that in Broken Hill.

Silver City and the long-term solution for the Far West region

Hydrostor's Silver City Energy Storage Centre project will be the backbone for permanent alternative power supply to the Far West region. The project will provide crucial long-duration energy storage capacity and stability to the Broken Hill region, with a capability of 200 MW and 1,600 MWh or 8 hours of storage at full output. The facility itself will comprise of two sets of 100 MW turbines and compressors, to both supply the National Electricity Market and maximize the deliverability of renewable generation in the region, as well as for redundancy in supply as a critical reliability backstop for Broken Hill. It will also be able to scale for load growth over time in the Broken Hill region.

The facility can meet a wide range of load needs, from very small to very large, and can run much longer at a lower output. This is increasingly important as demand for electricity during the day significantly decreases as solar (both grid-scale and rooftop) cover most of the daytime load. Electricity systems have a minimum amount of load that needs to draw from the grid for it to remain stable, as was seen in the days following the outage in 2024. Electrical load at Broken Hill, and its surrounds, very rarely exceeds 50 MW, allowing for long periods of supply from Silver City A-CAES when transmission is interrupted even without any further recharging from local renewable

resources. This is in reality is likely to be even longer as demand fluctuates, especially as consumers self-consume power from their solar installations. Most critically, Silver City A-CAES will form the basis of a synchronous supply backbone during extended periods of transmission outage given its ability to recharge using the local renewable generation and store it for continuous usage as part of the overall mini grid.

It is also important to note, that in the event of an outage, Silver City would be able to provide back-up power to both the community and the mining loads. It was noted that in the October event, mining loads were curtailed when demand was high and were used as an additional load to manage minimum generation issues, to ensure the lights stayed on in the local community. The preferred Silver City A-CAES-based long-term mini-grid solution will help ensure that large energy users in the community are not stood down during an outage, keeping their employment stable.

Unlike most electrochemical and battery applications, the Silver City A-CAES facility is synchronous, capable of long duration discharge without performance degradation, and will be capable of charging and discharging simultaneously to maximize the utilisation of renewable energy at times of outages to supply the region consistently. These renewables include both the grid-scale and rooftop solar prevalent in the community, as well as the significant amounts of regional wind generation – this is a unique and vital attribute that cannot be replicated with traditional diesel generators. Indeed, under current circumstances when diesel generators are required for back-up, it has been necessary to shut off local renewable generation creating a perverse circumstance where significant amounts of renewable generation are available, but unable to be used by the grid during an outage.

As a result of the above advantages, Silver City is intended to form the backbone to a long-term, reliable, robust and sustainable “mini grid” solution for Broken Hill. In parallel to scoping the Silver City A-CAES technical requirements, Transgrid has been actively designing this “mini-grid” to enable Broken Hill and its surrounds to operate in “islanded mode” (disconnected from the main grid during an outage). The mini-grid will connect Silver City to the existing power and renewable assets in the region, enabling the supply of electricity for days and even weeks without support from the National Electricity Market. Silver City is an integral component of the mini-grid, as it provides the much-needed scale of generation and storage, system strength, and resilience needed to keep the grid stable and manage the intermittency of renewable generation in the region and the variability of rooftop solar.

The regulatory process selecting Silver City for reliability in Broken Hill, and potential risks

The selection of Silver City as the preferred solution came through a Regulatory Investment Test for Transmission (RIT-T) conducted by Transgrid. The back up diesel generators that historically provided back-up power have been approaching the end of their useful life and therefore, Transgrid was required to explore both network and non-network options in a RIT-T. The RIT-T is a regulatory process which requires all transmission providers to compare relevant options (network and non-network) to identify a preferred option to a network need (in this case, maintaining reliable supply to Broken Hill).

Hydrostor responded to a RIT-T Project Specification Consultation Report detailing the issue with reliability in Broken Hill, published by Transgrid in 2019. The RIT-T process compared Hydrostor’s A-CAES facility with a second transmission line, replacement of the backup diesel generators, and other energy storage solutions relying on shorter-duration batteries. The economic assessment was to establish a preferred option with the highest net benefit for consumers. The RIT-T process was

iterative, with the final Project Conclusion Assessment Report selection of Silver City A-CAES as the preferred least-cost/maximum benefit solution to managing reliability in Broken Hill. The process was finalised in 2022.

Contract negotiations for the network services were completed in late 2023, and Hydrostor and Transgrid have been working actively since this time to implement the contract.

Hydrostor and Transgrid have been working together on solutions beyond the RIT-T's original requirements, including establishing the technical requirements for a wider array of complementary services to support Broken Hill, including for the long-term mini-grid solution under the current regulatory construct. Transgrid has also been working to establish an appropriate rule change to address a regulatory risk that some of the costs of the agreement may not be fully recoverable by Transgrid under the existing regulatory framework. To solve for the latter, Transgrid submitted the rule change request to the Australian Energy Market Commission in April 2024 seeking greater comfort for cost-recovery. We continue to collectively use best efforts to resolve risks associated with further regulatory processes, in order to avoid any compounding delays to the project and achievement of Financial Close for the project.

Benefits of A-CAES to the Broken Hill electricity system

The RIT-T was an in-depth cost-benefit analysis, comparing A-CAES to other possible solutions to supply Broken Hill, including refurbishing or replacing the existing diesel generators, as well as other back-up supply alternatives. Despite clearly being selected as the lowest cost solution through this process, the benefits of A-CAES also go beyond the specific terms of reference of the RIT-T, and include several operational, mini-grid integration, environmental and economic benefits that are highly significant to the region and local electricity grid. For ease of reference, the advantages of A-CAES paired with local renewables as the mini-grid solution compared to long-term usage of diesel generation for back-up supply or other alternatives include:

- Enabling the utilisation of otherwise stranded renewable assets already in place large-scale in the region, including its local use and its enhanced delivery to the National Electricity Market.
- Facilitating the integration of rooftop solar across the region, including providing a basis to leverage these resources during outage periods.
- Ability to charge and discharge simultaneously to enable grid stability and real-time load balancing with excess renewables.
- Better responsiveness and minimum-generation capabilities, with significant operational flexibility.
- Providing synchronous inertia and very long-duration capabilities at load levels needed for the region.
- Establishing long-term electrical infrastructure for the town and its surrounds without reliance on external fuel sources.
- Removing supply chain vulnerabilities and costs for fuel supply, with very low operating costs.
- Providing significant services to the local grid even during normal grid operations, as well as delivering services regularly to the National Electricity market.

- Zero emissions and a fully operational clean-energy solution for Broken Hill, making it one of the world's leading mini-grids.
- Significant local investment, construction and permanent jobs, and economic development as local infrastructure, especially compared to other alternatives.

Project timeline and key milestones

In parallel to the technical and regulatory aspects, Hydrostor has engaged in significant community engagement and development works. Some key milestones achieved to date include:

- The Project is currently expecting to receive Development Consent (DC) from the Department of Planning, Housing and Infrastructure (DPHI) in early March 2025. Hydrostor has already received draft conditions for the DC and is working to finalise this important milestone currently. Construction is anticipated to commence shortly after the receipt of the DC.
- The FEED engineering work is well progressed, and the project has partnered with Worley, a global leader in engineering and project management with operations in 45 countries.
- Hydrostor has secured access to all of the land required for both the project site (facility lease with Crown Lands) and the associated 16km transmission corridor that connects the project with Transgrid's network.
- Hydrostor has previously secured funding from ARENA and was awarded a Long-Term Energy Services Agreement (LTESA) from NSW Government in late 2023.
- Hydrostor has finalised agreements with Perilya, the mine operator co-located at the project site to utilise existing infrastructure and resources (as well as workforce).
- Capability building has commenced with the local community targeting local skills and inviting local businesses to participate in the project.
- A Community Benefits Agreement has been executed with the Broken Hill City Council, as well as Landcare and these are available in the public domain.
- Hydrostor is also partnering with the Clontarf Foundation, a not-for-profit organisation that exists to improve the education, discipline, life skills, self-esteem and employment prospects of young Aboriginal and Torres Strait Islander men.
- Engagement is ongoing with the Local Aboriginal Land Council, and this is focused on the creation of employment opportunities and raising cultural awareness in the region.

We appreciate the Committee's attention to this matter and look forward to continued collaboration to ensure a reliable and sustainable electricity supply for Far West NSW.

Sincerely,

Sara Taylor
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Hydrostor